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29 July - 5 Aug 1965

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Date ~ 15-30 Aug 65

MEMORANDUM FOR: Deputy Director for Science & Technology

SUBJECT : Long Range Requirements for Photo and SIGINT

1. Currently COMOR and USIB have approved versions of satellite photo requirements and SIGINT requirements which are applicable to the near term, 1 or 2 years, or are reasonably compatible with existing or relatively immediately available equipments. In Photo, for example, KH-4 [redacted] considered with only minor improve- [redacted] these near term requirements papers are to be followed by requirements documents relating to the longer term which, in effect, are to be guide lines for research and development efforts.

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2. The standard pattern for an "operating" photographic requirement (as implied by the near term) is to describe the task in terms of number of targets and the frequency of looks for each system, augmented by periodic total area search. "Status of information" environment is an important ingredient in this quantitative estimate of the size of the task. With no a priori information (or information

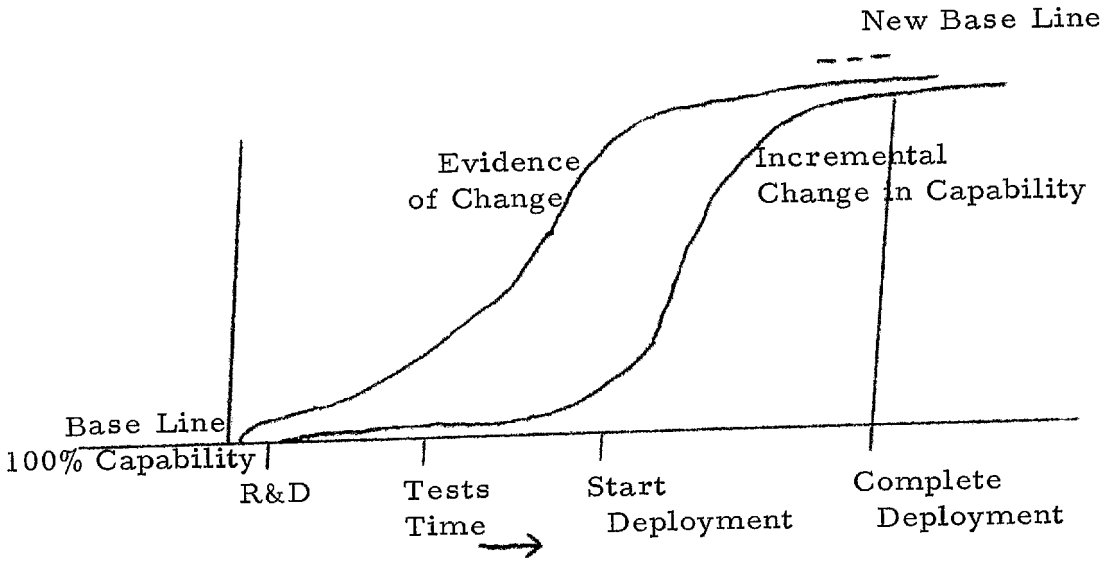
from other sources) the size of the task is much larger than would be the case when a base line of information has already been established.

3. An analogy is the task of keeping tabs on an elephant, its moves, its emotions, its capabilities, etc. If one had never seen an elephant, nor a picture, nor understood how it moved or acted, the first need would be for a picture, then a behavior theory that showed its motion depended on legs rather than, say, wheels, its emotional status on, say, heart rate, and its strength on the diameter of some particular muscle and its improvement in capability on, say, growing additional appendages. Having a picture and a proved theory of operational behavior, one would only need to watch one leg to detect motion, monitor heart beat to detect emotion and size the leg to estimate strength and a cursory overall look to detect the presence of new components. This latter task is quite different in size, type and quality from acquisition of the original picture and establishment of the behavior pattern.

4. In recent months we have received multiple photo coverage of areas and targets in the Sino Soviet Bloc. We now have a comparatively accurate base line on existing capabilities. We also have good calibration on rates of change both from observation and knowledge of

our own rates. We are now entering a phase of monitoring changes, detecting actions and estimating capabilities on a well defined and relatively well understood creature. The real question is, what are the implications of this new environment on future information collection systems?

5. A graphical portrayal of the status change detection task might be:



The scales depend on the particular action. For example, deploying one additional ICBM might occur in a matter of a very few months but would give a very small increase in capability. A transition from soft

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to hardened ICBM's, on the other hand, might be characterized by several years and a very appreciable increase in capability.

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7. The impact on future system characteristics can be estimated by visualizing the information environment which is likely to exist during the lifetime of the candidate systems. It is generally accepted that for photo systems, unless a large qualitative gain is

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made [redacted] the environment will continue to be characterized by a well established base line -- so far as conventional search, surveillance, technical measurement and cartographic tasks are concerned. New tasks, such as Intentions Detection, Damage Assessment in general war, and ocean surveillance, will also be accomplishable against a generally well established background, at least in a collection sense.

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8. It should be noted that the status of information environment can have important impact on things other than new collection system design, such as required processing speed, type and speed of analysis and reporting and, in fact, the general feeling of confidence one has in his estimation of the international situation. Similarly, many other factors, such as changing alliances, enemy anti-satellite actions, and the influence of collateral sources, also have an impact on collection system design. The status of information environment has been singled out for consideration because it does not have a long historical appreciation and it has an apparent large impact on systems.

9. With respect to the impact on new Photo Satellite systems, it is conceivable that a study, taking into account anticipated rates of change and relationship of such changes to overall posture, might result in a search requirement as low as, say, a specified 10% of the total area only once a year. For routine surveillance the number of targets to be looked at might reduce to the order of less than 500 target looks per year. For coverage of special targets for technical

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intelligence purposes, the requirement might go up markedly, both in number of targets and frequency, perhaps to several thousand target looks per year. In essence, one could consider that after a base line is established, continued collection is sort of for indications, the sampling rate and the reaction time needed being dependent on the specific functional task. [redacted] 25X1B

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10. In summary, then, one of the design criteria for the development of new collection criteria is the role of the system, status change detection or base line establishment. The next generation photo satellites should not necessarily possess the capabilities for data base establishment that had to be built into current systems. For SIGINT satellites, anticipation of how and when the data base will be established has an important impact on the design of what must almost be considered the first really useful systems, the ones yet to be developed.

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[redacted]
Chief, Systems Analysis Staff

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Remarks:

Bud -

I prepared this for general information but, hopefully, for COMOR members.

May I have your comments?

[redacted]

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Remarks:

I agree with a number of your ideas (am not sure about the elephant). I would like to discuss with you at your convenience.

GCM

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Remarks:

Phil -

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Here's a new version. Don't know whether it answers your objections but let me have your comments.

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